CLAIMS

1. Method for the conversion of signals called input digital signals, comprising a phase for the modulation of said input signals; characterized in the said modulation is performed by the implementation of a vector lattice encoder and in that said method comprises the following encoding steps:

- a preliminary step consisting of the choice of three parameters respectively representing a determined number N of distinct variables associated with said input signals, called output candidates, a determined number K of possible temporal developments of said candidates, and a temporal variable T, called historical decision depth, determining a maximum number of iterations before the generation of a result;

- a first step for the filtering (*Hx*) of said input signals (*x(n)*) so as to generate first filtered signals;

- a second step for the filtering (Hq) of signals representing candidates, so as to generate second filtered signals representing filtered candidates;

- a third step in which the difference is taken between the said first and second filtered signals;

- a fourth step consisting of the pre-selection, by means of a pre-selection element, for each of said N candidates, of the first to the Kth modified candidates representing said K possible developments and each meeting a first predetermined criterion, said first candidate (a) being the one that minimizes said difference;

- a fifth step consisting of the weighting of said difference by means of function called a cost function classifying said *K* developments so as to mark the candidates designed to be eliminated or kept for a subsequent iteration of the steps of said method, and of the transmitting of said modified candidates to a selection element;

- a sixth step consisting of the selection of the best candidate by said selection element by comparison with a second predetermined criterion minimizing said cost function (*W*);

- a seventh step consisting of iterations from the first to sixth steps until said historical decision depth *T* is attained; and

- an eighth step consisting of choosing the best candidate at the end of said seventh step.

2. Method according to claim 1, characterized in that said number N of said output candidates is equal to 8, said determined number K of possible developments of said output candidates is equal to 2, and said historical decision depth T is equal to 3.

3. Method according to claim 1, characterized in that said filtering steps (*Hx, Hq*) consist of a low-pass filter made by means of a filter called a Chebychev II filter with optimized zeros.

4. Method according to claim 1, characterized in that it comprises an additional step performed before said encoding steps consisting of an over-sampling of said input signals, so as to raise the frequency of these signals.

5. Method according to claim 4, characterized in that the over-sampling factor is equal to 128.

6. Method according to claim 2, characterized in that, K being equal to 2, said pre-selection made during said fourth step consists of the selection, as possible developments, known as options, for each of said N candidates, of the first and second options (a, b) and in that, a first candidate, corresponding to the first option (a) is the one whose output signal ($q(n)$) minimizes said difference and a second candidate corresponding to the second option (b), is the one keeping the same output state as in the turn preceding the iteration.

7. Method according to claim 6, characterized in that said cost function carries out the following determining and computation operations during said fifth step:

   - if said first (a) and second (b) options for a determined candidate have different signs and both are non-zero, then said second option (b) cannot survive;

   - if the amplitude of said difference in signals is greater than a predetermined threshold, said second option (b) cannot survive;

   - the counting of a number called a transition number by means of an up-down counter increasing its content by the one unit whenever said second option (b) is selected rather then said first option (a) and whenever said second option (b) is greater then said first option (a) and diminishing its content by one unit if the contrary is the case;

   - if the amplitude of said difference is smaller then said threshold and said number of transitions counted is equal to a predetermined number, said first option (a) cannot survive and, if not, said second option (b) cannot survive;

   - authorizing the selection of said second option (b) if and only if the absolute value of said content is smaller than or equal to the number 2;

- the marking of the candidates that cannot survive for a subsequent iteration.

8. Method according to claim 7, characterized in that the best candidate selected during said sixth step is the candidate minimizing the difference in energy between signals (Ref 8) delivered by said cost function (W) and an optimal output signal on a determined period of time.

9. Method according to claim 8, characterized in that, $e(n)$ being said output signals delivered by said cost function (W), $y(n) = q(n-T)$, said signal which is optimal over a period $(n-T, n)$, with n representing an instantaneous temporal value, T said historical decision depth, $f(n, k)$ said signal $e(n)$ at the instant n for a candidate k and $q(n,k)$ the signal $y(n)$ at the time n for this same candidate, the selected candidate is the one whose survival is permitted for a subsequent iteration by said cost function (W) and for which the function $E(n,k)$ is minimized, said function satisfying the following relationship:

$$E(n, k) = (f(n-T, k) - q(n-T,k))^2 + (f(n-T+1, k) - q(n-T+1,k))^2 + \ldots + (f(n,k) - q(n,k))^2.$$

10. Method according to claim 2, characterized in that, K being equal to 2, said pre-selection made during said fourth step consists of the selection, as possible developments, known as options, for each of said N candidates, of the first and second options (a, b), a first candidate, corresponding to the first option (a) whose output signal $(q(n))$ minimizes said difference.

11. Method according to claim 10, characterized in that said cost function (W) carries out the following determining and computation operations during said fifth step:

- if the amplitude of said difference in signals is greater then a predetermined threshold, said second option (b) cannot survive;

- the counting of a number called a transition number by means of an up-down counter increasing its content by the one unit whenever said second option (b) is selected rather then said first option (a) and whenever said second option (b) is greater then said first option (a) and diminishing its content by one unit if the contrary is the case;

- if the amplitude of said difference is smaller then said threshold and said number of transitions counted is equal to a predetermined number, said first option (a) cannot survive and, if not, said second option (b) cannot survive;

- authorizing the selection of said second option (b) if and only if the absolute value of said content is smaller than or equal to the number 2;

- the marking of the candidates that cannot survive for a subsequent iteration.

12. Method according to claim 11, characterized in that said best candidate selected during said sixth step is the candidate minimizing the number of transitions over a predetermined period inasmuch as the energy of the error introduced by this candidate is limited relative to the energy of a candidate called a natural candidate which would be formed only by said first option (a).

13. Method according to claim 8, characterized in that, $e(n)$ being said output signals delivered by said cost function (W), $y(n) = q(n-T)$ said signal which is optimal over a period $(n-T, n)$, with n representing an instantaneous temporal value, T said historical decision depth, $f(n, k)$ said signal $e(n)$ at the instant n for a candidate k and $q(n,k)$ the signal $y(n)$ at the time n for this same candidate, the selected candidate is the one whose survival is permitted for a subsequent iteration by said cost function (W) and for which the function $E(n,k)$ is minimized, said function satisfying the following relationship and being limited relative to the same relationship computed for said natural candidate:

$$E(n, k) = (f(n-T, k) - q(n-T,k))\hat{}2 + (f(n-T+1, k) - q(n-T+1,k))\hat{}2 + \ldots + (f(n,k) - q(n,k))\hat{}2.$$

14. A device for the implementation of the method according to any one of the preceding claims, characterized in that it comprises, in cascade connection, a modulator comprising at least over-sampling circuits for the over-sampling of said input signals (s_{30}) and an encoder performing said lattice modulation.

15. A device according to claim 14, characterized in that said modulator is made on the basis of an automatic stored-program data-processing system, a specialized digital signal processor, a dedicated integrated circuit or a field-programmable integrated circuit.

16. Application of the method to claim 1 to the making of an audio signal digital amplifier said amplifier comprising, in cascade connection, a digital signal reception circuit, a modulation circuit comprising an over-sampler and an encoder performing said lattice modulation, a switching circuit converting said digital signals into analog signals delivered at its output and an output filter for the filtering of said analog signals.

17. Application according to claim 16, characterized in that said switching circuit has three logic switching circuits.